REMARKS

This is in response to the Office Action mailed on June 21, 2006, which acted on pending claims 1-27. Claims 1-18 were previously elected with traverse. In the Office Action, claims 19-27 were withdrawn from consideration due to the lack of an allowable generic or linking claim. Claims 1-18 were rejected.

Claim Rejections – 35 U.S.C. 103

Claims 1-18 were rejected under 35 U.S.C. ' 103(a) as being unpatentable over Lee et al. (Optical Materials 21, of record) in view of Zhou et al. (Advanced Functional Materials 2001, of record).

Independent claim 1 recites a Schottky diode that comprises a polycrystalline organic semiconductor layer, a rectifying contact on a first surface of the organic semiconductor layer, a doped buffer layer formed of an amorphous doped organic semiconductor that is in contact with a second surface of the organic semiconductor layer, and an ohmic contact to the doped buffer layer.

The Examiner correctly noted that Figure 1 of Lee et al. discloses a Schottky diode comprising a rectifying contact, an ohmic contact, and a polycrystalline organic semiconductor layer in between the two. In addition, the Examiner correctly noted that Zhou et al. discloses an amorphous doped organic semiconductor. Based on these two disclosures, the examiner contended that Ait would have been obvious to one of ordinary skill in the art at the time the invention was made to form the diode of Lee et al. comprising a doped buffer layer of an amorphous doped organic semiconductor, such as taught by Zhou et al. in order to improve the breakdown voltage and to prevent spiking of the ohmic contact through the organic semiconductor.@ This modification was necessary because the Examiner noted that ALee et al. does not disclose a doped buffer layer of an amorphous doped organic semiconductor formed between the organic semiconductor layer and the ohmic contact.@

In order to reject a claim under 35 U.S.C. ' 103 as being obvious, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify

the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. 2143. Therefore, in order to reject independent claim 1 as being obvious over the combination of Lee et al. and Zhou et al., there must be a suggestion or motivation to modify the Schottky diode disclosed by Lee et al. based on the teachings of Zhou et al., and the modified Schottky diode must disclose each and every element recited in claim 1.

As mentioned above, the Examiner noted that Lee et al. does not disclose a doped buffer layer formed of an amorphous doped organic semiconductor formed between the organic semiconductor layer and the ohmic contact. See, e.g, Fig. 1 of Lee et al., which shows organic diodes formed with pentacene (a polycrystalline organic semiconductor layer) between ohmic and rectifying contacts. Zhou et al. discloses the use of amorphous doped organic semiconductors for use in organic light emitting diodes (OLEDs), and explicitly discusses the turn-on voltage and electroluminescent efficiency of the OLEDs. These parameters are affected according to the teachings of Zhou et al. by substituting an amorphous doped organic semiconductor material for an undoped organic semiconductor material. See, e.g., p. 311 (Section 3) and p. 314 (Section 4) of Zhou et al. Zhou et al. does not teach or suggest the use of an amorphous doped organic semiconductor material in combination with a polycrystalline organic semiconductor layer, but instead offers the amorphous doped organic semiconductor material as an alternative semiconductor layer for OLEDs. In fact, Zhou et al. specifically points out the problems of using polycrystalline layers (see right-hand column of p. 310, stating that "phthalocyanines are not well suited for OLEDs due to their polycrystalline properties..."). Thus, because Zhou et al. teaches away from the use of polycrystalline layers, there can be no finding of a suggestion or motivation to combine the teachings of Lee et al. and Zhou et al. in such a way that would include a polycrystalline organic semiconductor layer, as is required by independent claim 1. Moreover, the combination of Lee et al. and Zhou et al. would result in the pentacene layer of Lee et al. being replaced with an amorphous doped organic semiconductor layer as taught by Zhou et al., since neither reference discloses, teaches or suggests how both types of semiconductor layers might be used together. This combination of teachings therefore would not satisfy each and every element recited in claim 1, which requires both a polycrystalline organic semiconductor layer and a doped buffer layer in contact with the polycrystalline organic

semiconductor layer, the doped buffer layer being formed of an amorphous doped organic semiconductor. The use of both of these semiconductor layers in the present invention provides an increased breakdown voltage to the Schottky diode, a characteristic that was not addressed by either Lee et al. or Zhou et al. in their discussion of the configurations or materials taught by those references. In view of these shortcomings of the references and their teachings, a prima facie case of obviousness has not been established, since the requisite suggestion or motivation to combine the teachings of the references is lacking, and since the combination of references would still fail to disclose each and every element recited in claim 1. The rejection of independent claim 1 under 35 U.S.C. 103(a) should accordingly be withdrawn.

Claims 2-9 depend from independent claim 1, and are allowable therewith. In addition, it is respectfully submitted that the combinations of features recited in claims 2-9 are patentable on their own merits, although this does not need to specifically addressed since any claim depending from a patentable independent claim is also patentable. See M.P.E.P. 2143.03, citing In re Fine, 5 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1988).

Independent claim 10 also recites a polycrystalline organic semiconductor layer having a surface that is in contact with a doped buffer layer formed of an amorphous doped organic semiconductor, similar to the recitations of claim 1. Independent claim 10 is allowable for the same reasons discussed above with respect to claim 1. Claims 11-18 depend from independent claim 10, and are allowable therewith. In addition, it is respectfully submitted that the combinations of features recited in claims 11-18 are patentable on their own merits, although this does not need to specifically addressed since any claim depending from a patentable independent claim is also patentable. See M.P.E.P. 2143.03, citing In re Fine, 5 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1988).

Withdrawn Claims

Claims 19-27 were withdrawn from further consideration as being drawn to a non-elected invention, for lack of an allowable generic or linking claim. For the reasons discussed above, independent claim 1 is in condition for allowance. Independent claim 1 is generic to claims 19-27, and claims 19-27 should accordingly be considered and allowed.

CONCLUSION

In view of the foregoing, all pending claims 1-27 are in condition for allowance. A Notice to that effect is respectfully requested. The Examiner is cordially invited to contact the undersigned at the telephone number listed below if such a call would in any way facilitate the allowance of this application.

Respectfully submitted,

8/30/06
Date

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